Solid Lithium Ion Conductors for Lithium Solid State Batteries (SLIC)

Completed Technology Project (2017 - 2018)

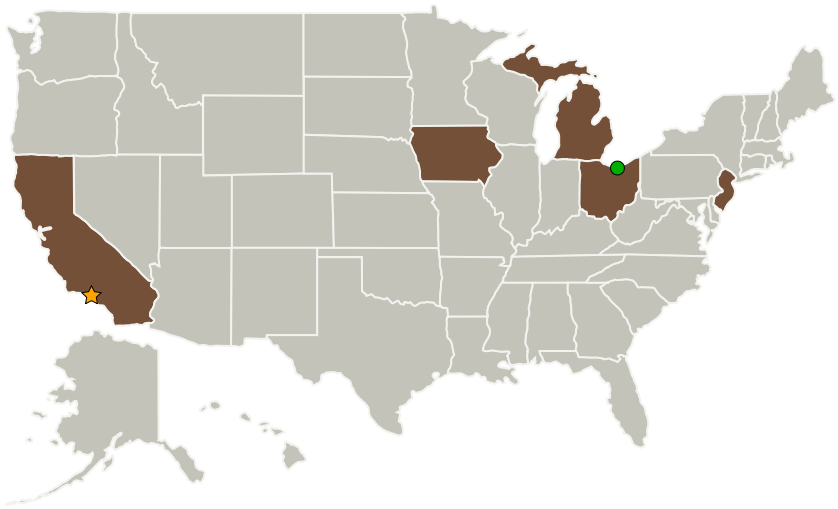
Project Introduction

To identify the most lithium-ion conducting solid electrolytes for lithium solid state batteries from the emerging types of solid electrolytes, based on a combination of in-situ electrochemical and ex-situ analytical techniques.

Anticipated Benefits

Lithium solid sate batteries are being perceived as the next generation advanced battery technology. Being compact, lightweight, robust and safe, these batteries will be more beneficial to NASA missions, compared to the conventional Li-ion batteries. They will also enable long-life missions, Venus aerial missions. Additionally, they will be compatible with the Planetary Protection requirements (for Ocean Worlds' missions), i.e., Dry Heat Microbial reduction.

Primary U.S. Work Locations and Key Partners



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Center Innovation Fund: JPL CIF

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
California Institute of Technology(CalTech)	Supporting Organization	Academia	Pasadena, California
●Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
Iowa State University	Supporting Organization	Academia	Ames, Iowa
University of Michigan-Ann Arbor	Supporting Organization	Academia	Ann Arbor, Michigan

Primary U.S. Work Locations	
California	Iowa
Michigan	New Jersey
Ohio	

Project Transitions

October 2017: Project Start

September 2018: Closed out

Closeout Summary: Conventional liquid electrolytes in Li-ion cells are combustible and pose serious safety issues. New solid electrolytes with fast lithium mobility have been emerging, but their applicability to lithium rechargeable cells is still not demonstrated. There are a few issues related to the reactivity with the electrode materials. Also, the areal capacity (mAh/cm2) is quite low (70 µAh/cm2), which can be improved with a new design of composite cathodes impregnated with solid electrolytes.

Project Website:

https://www.nasa.gov/directorates/spacetech/innovation_fund/index.html#.VC

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Center / Facility:
Jet Propulsion Laboratory (JPL)

Responsible Program:
Center Innovation Fund: JPL CIF

Project Management

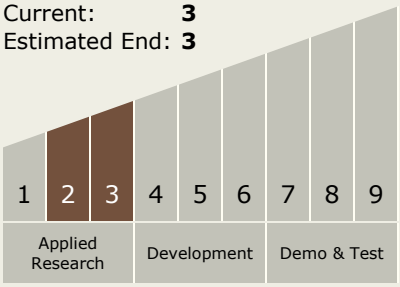
Program Director:
Michael R Lapointe

Program Manager:
Fred Y Hadaegh

Principal Investigator:
Ratnakumar V Bugga

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.1 Electrochemical: Batteries

Target Destinations

Mars, Earth, Others Inside the Solar System